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ABSTRACT

The study investigated possible relationships between rating scales frequently used for diagnostic purposes with children in the diagnostic category of attention deficit disorder/hyperactivity (ADD/H) and performance on the Gordon Diagnostic System (GDS). The study also examined whether subgroups of ADD/H children could be discriminated utilizing the GDS scores and if a relationship exists between self-imposed versus instrument paced structured situations and behavioral observations of activity level. Subjects were 18 children (ages 6 to 12) referred for ADD/H. Parents filled out rating scales and direct behavior assessments were conducted using the GDS. Results suggested that subgroups of ADD/H children could possibly be diagnosed by utilization of the GDS. No significant effects for self imposed structure versus instrument-paced structure were found. (DB)

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Assessment of Subcategories of Hyperactivity

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Abstract

Attention Deficit Disorder/Hyperactivity (ADD/H) has proven to be a highly complex diagnostic category suggestive of multiple etiologies and subgroups. The treatment of ADD/H is further complicated by these heterogeneous subgroups. The purpose of the present study was to ascertain if there was a relationship among rating scales frequently utilized for diagnostic purposes with ADD/H and subjects' performance on the Gordon Diagnostic System (GDS). The study also asked if subgroups of ADD/H children would be discriminated utilizing the GDS scores. Finally the study sought to determine if a relationship existed between self-imposed vs. instrument-paced structured situations and behavioral observations of activity level.

Assessment of Subcategories of Hyperactivity

Substantial differences exist in regard to definition, etiology, evaluation and management of the attention deficit disorder/hyperactive (ADD/H) child. Various etiologies have been proposed in regard to ADD/H with the three most common being: 1) environmental toxins (food allergies, lead poisoning, drug reactions), 2) learned behavior patterns, and 3) a central nervous system (CNS) dysfunction (Barkley, 1981; Schmitt, 1975; Safer & Allen, 1976; Quinn & Rapoport, 1974).

Data which shows that some hyperactive children can be successfully treated with diet changes, some with behavior modification and some with drugs suggests more than one broad category of hyperactivity. The concept of more than one subgroup of hyperactivity is not a new one. The earliest references to children described as hyperactive (Still, 1902) suggested multiple etiologies. Later research by Luria (1960), Young and Klein (1981) and Vincent, Williams, Harris, and Duval (1981) have each identified subgroups within the hyperactive category; however, these subgroups are not equivalent across studies. Regardless of the previously cited research most hyperactive children have been treated as a homogeneous group with the specific treatments being a function of the person in charge.

In both research and therapy with ADD/H children the label may be more descriptive than diagnostic. Perhaps one of the reasons for this is that there is no good basis for determining subcategories.

The purpose of the proposed study was to select ADD/H children based on rating scales, and then to make direct assessments of ADD/H with the Gordon Diagnostic System (GDS). (Gordon, McClure & Post, 1986). Behavioral observations of the child were also done while the child was engaged in two different tasks. There were three primary questions asked in this study:

1. Was there a relationship among the the rating scales filled out by the parents and the child's performance on the GDS which would allow for a more precise screening procedure for identifying ADD/hyperactivity?

2. Could subgroups of hyperactive children be discriminated by assessment tools designed to detect hyperactivity/attention deficit disorders (GDS scores)?

3. Is there a significant difference in the behavioral observation ratings of ADD/H subjects under self-imposed structure vs. instrument-paced structure conditions?

Method

Eighteen subjects were utilized in the study - 12 males and 6 females. The average age of the subjects was 8 years 7 months with an age range of 6 years 9 months to 12 years 9 months.

The parents were asked to fill out rating scales concerning their child's behavior patterns. The rating scales included the Conners' Rating Scale specific to hyperactivity (Conners, 1985), Davids' Rating Scale (Davids, 1971), and Child Behavior Profile (Achenbach, 1982). In addition, the DSM III (American Psychiatric Association, 1980) guidelines that pertain directly to the diagnosis of ADD/H were put in the format of a

rating scale.

Next the child was evaluated with the GDS and a videotape was made to allow for an independent rating of behavior patterns under two different environmental situations. Each subject's behavior was sampled in 10 second intervals and was scored as either showing the presence of movement or the absence of movement. The rating scale was based on the work of Prior, Wallace, and Milton (1984).

The GDS is an objective assessment device that aids in the diagnosis of children referred for ADD/H. The GDS is a microprocessor-based, portable unit which administers a series of game-like tasks. The Delay Task requires the child to inhibit responding in order to earn points, and requires the child to impose internal structure/controls in order to obtain reward points. The Vigilance task yields data regarding the child's ability to focus attention on a task and to maintain that attention over time in absence of feedback.

Results

Pearson correlations were performed to determine the relationships among the behavior rating scales (Inattention-DSMIII, Impulsivity-DSMIII, Hyperactivity-DSMIII, Davids' Scale, Achenbach's Checklist, and Conners' Scale for Hyperactivity) and the three scores obtained from the subject's performance on the GDS [Efficiency Ratio (ER) - Delay, Correct Responses (CR) - Vigilance, & Errors of Commission (EC) - Vigilance]. In terms of the GDS scores, the Impulsivity scale using DSM-III criteria was significantly correlated with Delay ER. Vigilance CR from the

GDS was significantly correlated with the Hyperactivity scale - DSM III criteria. No other significant correlations were found among the rating scales and any of the three GDS scores.

Insert Table 1 about here

Fisher's Exact Tests were performed to determine the relationships among the behavior rating scales with the three GDS scores. When groups were constructed by subjects classified as ADD/H or not ADD/H on all six scales and compared to the GDS scores, there was agreement in 10 of the cases (67%, Fisher's Exact Test, $p = .087$). When groups were constructed where subjects were classified as ADD/H or not ADD/H on at least five of the six rating scales, there was agreement in 13 cases (72%, Fisher's Exact Test, $p = .082$).

The second question asked in the study was whether or not subgroups of hyperactive children could be discriminated by utilizing the scores from the GDS. Based on comparisons with the standardization sample for the GDS, six subgroupings were suggested by the scores of the subjects in this study. Four primary subgroupings emerged, which accounted for 88% of the subject pool.

Insert Table 2 here

A one-way analysis of variance was performed with the self-imposed structure vs. instrument-paced structure situation serving as the independent variable (Delay vs. Vigilance tasks), and percent of time on task without extraneous motor involvement as the dependent variable. The Delay Task required the subject to impose structure in order to perform the task adequately, and

on the Vigilance Task the structure was imposed by the task itself. Results of the ANOVA did not indicate any significant difference between the self-imposed structure vs. instrument-paced structure tasks in terms of motor behavior exhibited ($F = 1.54$; $df = 1,34$; $p = .2203$).

Discussion

The behavior rating scales displayed minimal correlations with the subjects' performance on the GDS tasks except for the Impulsivity-DSM III and Hyperactivity-DSM III scales and ER - Delay and CR - Vigilance, respectively. The guidelines for ADD/H from DSM III may be effective in helping screen for those children who will also significant problems in these areas on the GDS. More research is needed, however, with the scales derived from the DSM III guidelines.

While Fishers' exact tests only approached significance, it should be noted that the subject population in the current study had already been screened by local pediatricians and/or school psychologists. Different results may have been obtained if the criterion measures had been utilized to differentiate hyperactive from nonhyperactive children in the general population.

The GDS did designate specific subgroupings of hyperactive children based on their performance on the Delay and Vigilance Tasks. The GDS delineates eight possible major subcategories based on ER, CR and EC scores, and the current study had subjects in six of the eight subcategories. There were four primary subgroupings that accounted for 88% of the subject pool.

The ability to differentiate subgroups has a tremendous

potential in being able to treat ADD/H children with more appropriate interventions, and to ultimately teach them the necessary cognitive strategies to control their own behavioral responding. It is also beneficial in identifying those subjects who might benefit from pharmacological intervention. Not all children diagnosed as ADD/H benefit from medication although Copeland, Wolraich, Lindgren, Milich, and Woolson (1987) report that the most frequently therapy for ADD/H was methylphenidate prescribed by physicians. It may also possible to delineate those children who may not be truly ADD/H but are displaying the symptoms. Twenty-two percent of the subjects in the current study fell into this category.

The ANOVA did not indicate significant effects for self-imposed structure vs. instrument-paced structure situations. While the instrument-paced task was defined as requiring internal structure, the parameters of the task were set. If the child had been placed in an environment where he/she had to choose from an array of activities rather than having prearranged activities, the results might have been different.

In summary, the results of the present study indicates that subgroups of ADD/H children could possibly be diagnosed by utilization of the GDS. This type of diagnostic procedure has the potential for helping to implement more effective treatment techniques with these children. While the rating scales did not successfully differentiate among subgroups in general, they were able to successfully screen for ADD/H. The rating scales would be beneficial for initial screening purposes with more in-depth

follow-up evaluation being conducted with the GDS as a primary component to ascertain probable subcategories and formulate treatment plans based on these subcategories rather than treating ADD/H children as a homogeneous group.

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Table 1

Correlation Matrices for the Three GDS Variables

with All Other Measures

	Inattention (DSM-III)	Impulsivity (DSM-III)	Hyperactivity (DSM-III)	Davids' Scale	Achenbach Scale	Conners Scale	Delay ER	Vigilance CR	Vigilance EC
Inattention (DSM-III)		.7891 p=.000**	.1456 p=.282	.4935 p=.019*	.5241 p=.013**	.4643 p=.026*	.4229 p=.040*	-.3081 p=.107	.0138 p=.478
Impulsivity (DSM-III)			.1122 p=.329	.3730 p=.064	.5510 p=.009**	.4453 p=.032*	.4402 p=.034*	-.2780 p=.132	.0867 p=.366
Hyperactivity (DSM-III)				.4338 p=.036*	.0995 p=.347	.6545 p=.002**	.1000 p=.346	.4059 p=.047*	-.0339 p=.447
Davids' Scale					.2418 p=.167	.7699 p=.000**	.0574 p=.411	.1187 p=.319	.1967 p=.217
Achenbach Scale						.3150 p=.102	.1473 p=.280	-.1131 p=.327	-.0229 p=.464
Conners Scale							.0849 p=.369	.0507 p=.421	.3156 p=.101
Delay(ER) Scale								-.4997 p=.017*	-.0701 p=.391
Vigilance(CR) Scale									-.2030 p=.210
Vigilance(EC) Scale									

*p < .05; **p < .01

Table 2

Subcategories Based on the GDS Tasks

	Number of Subjects	Percent of Subjects
I. Normal Delay, Normal CR and EC	4	22%
II. Normal Delay, Normal CR and Abnormal EC	0	0%
III. Normal Delay, Abnormal CR and EC	4	22%
IV. Normal Delay, Abnormal CR and Normal EC	1	6%
V. Abnormal Delay, Normal CR and EC	1	6%
VI. Abnormal Delay, Normal CR and Abnormal EC	5	28%
VII. Abnormal Delay, Abnormal CR and Normal EC	0	0%
VIII. Abnormal Delay, Abnormal CR and EC	3	16%